

EXCENTRADENIA, A NEW GENUS OF MALPIGHIACEAE FROM SOUTH AMERICA

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When I described *Hiraea propinqua* in 1994 I discussed the problems created in *Hiraea* by the inclusion of *H. adenophora* Sandwith and its relatives, but hesitated to segregate that complex as a distinct genus (Anderson 1994, pp. 132–133). Now I have come to the conclusion that segregation is inevitable and desirable, so that *Hiraea* can return to the homogeneity that distinguished it before these species were described.

Excentradenia W. R. Anderson, gen. nov.—TYPE: *Excentradenia adenophora* (Sandwith) W. R. Anderson.

Lianae lignosae. Lamina foliorum eglandulosa vel margine glandulis parvis instructa, venis tertiariis scalariformibus; petiolus biglandulosus; stipulae parvae, triangulares, basi petioli vel caule juxta petiolum portatae, vel nullae. Inflorescentia axillaris racemus 3–7 (–9) umbellarum 4-florarum; bracteae floriferae eglandulosae; pedunculus brevis vel nullus; 1 bracteola cujusque paris eglandulosa, altera uniglandulifera glandulo versus centrum umbellae excentrico; pedicellus in alabastro circinatus. Sepala triangularia vel ovata, apice acuta revolutaque. Petala lutea, glabra. Stamina 10, omnia fertilia. Styli 3, stigmatibus introrso, apice dorsaliter truncati, apiculati, vel breviuncinati. Samarae ala lateralis membranacea, plerumque subcircularis, apice usque ad nucem incisa, basi continua vel interdum usque ad nucem incisa, nuce subglobosa.

Woody vines. Leaves opposite, subopposite, or alternate; petiole biglandular at or above middle, the lamina eglandular or bearing small glands on margin, the tertiary veins strongly parallel (scalariform); stipules small, triangular, borne on very base of petiole or on adjacent stem, or absent. Inflorescence a single axillary raceme of 3–7 (–9) 4-flowered umbels, with 1 umbel terminal and the other 1–4 pairs axillary to bracts bearing stipules and often petiole glands; floriferous bracts small, persistent, eglandular; floriferous peduncle short or absent; bracteoles small, persistent, one of each pair bearing 1 bulging eccentric abaxial gland toward center of umbel, the gland 0.7–1.1 mm long, circular or elliptical in outline; pedicel well developed, circinate in bud as far as known. Sepals 5, triangular or ovate, acute at apex and revolute in anthesis, all eglandular or the lateral 4 abaxially biglandular, the glands broadly elliptical to orbicular. Corolla bilaterally symmetrical, the posterior petal strongly differentiated from the lateral 4; petals yellow, glabrous. Receptacle glabrous. Androecium bilaterally symmetrical; stamens 10, all fertile, glabrous; filaments briefly connate at base; anthers \pm alike. Gynoecium bilaterally symmetrical, the anterior style shorter than the posterior styles; ovary with the 3 carpels nearly distinct, all fertile; styles inserted low on ventral face of carpels, the apex with a large internal stigma and dorsally truncate, apiculate, or

bearing a hook up to 0.3 mm long. Fruit dry, breaking apart into 3 samaras separating from a short pyramidal torus; samara with a large, membranous, usually subcircular lateral wing borne on upper edge of nut, continuous at base and incised to nut at apex, or (in *E. adenophora*) sometimes incised to nut at both apex and base; dorsal wing small; intermediate winglets absent; nut subglobose; ventral areole circular, 1.5–2 mm in diameter, partially surrounded (on the sides but not around the base) by an irregular callose thickening 0.5–1 mm thick; carpophore absent.

Excentradenia is probably a close sister to the genus *Hiraea* Jacquin. They are linked at least by scalariform tertiary veins in the leaf, lamina glands borne only on the margin, flowers borne ultimately in umbels, nearly distinct carpels, a subglobose nut in the samara, and a callose thickening along the sides of the samara's circular ventral areole; having a glandular-fimbriate posterior petal may eventually prove to be another feature of their common ancestor. Until the phylogeny of the genera with mascagnoid samaras can be resolved, it is impossible to say which of these character-states are synapomorphies and which are symplesiomorphies. The differences between *Hiraea* and *Excentradenia* are summarized in the following couplet:

1. Stipules very small, triangular, borne on petiole at very base or on adjacent stem, or absent; inflorescence an axillary raceme of 3–7 (–9) 4-flowered umbels; one of each pair of bracteoles bearing a large bulging eccentric abaxial gland toward center of umbel; pedicel circinate in bud; lateral wing of samara incised to nut at apex but not at base, producing a single basally continuous wing, or (in *E. adenophora*) sometimes incised to nut at both apex and base.

Excentradenia.

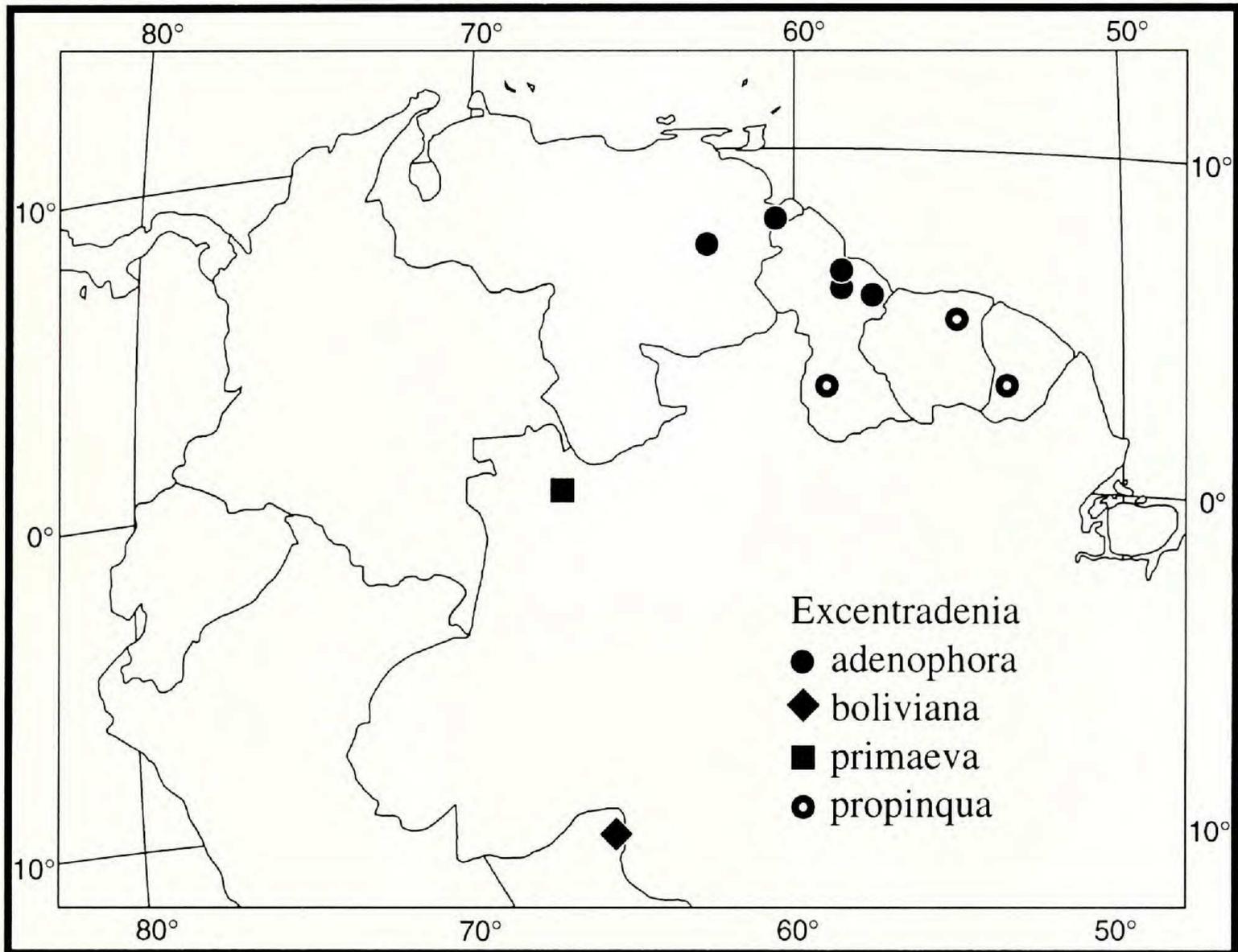
1. Stipules elongated, borne on petiole at least somewhat above base; inflorescence an axillary cyme of 3–7 4-flowered umbels or a single umbel of 5–many flowers; bracteoles eglandular; pedicel straight in bud; lateral wing of samara incised to nut at both apex and base, producing 2 completely separate wings.

Hiraea.

The eccentric bracteole glands found in all species of *Excentradenia*, to which the name refers, are most likely a synapomorphy of those species, as are the elongated epipetiolar stipules of *Hiraea*, so it seems probable that both genera are monophyletic in the strictest sense. The difference between their inflorescence branching deserves further comment. In those specimens of *Excentradenia* in which there are more than three umbels, they are arranged as two to four successive pairs originating from the same axis, followed by a terminating umbel. In *Hiraea* this never happens. If the inflorescence is branched, it is strictly cymose—it terminates in an umbel, and the two lateral branches are axillary to a single pair of bracts on the stalk below. Those branches terminate in an umbel, and may be subtended by another pair of lateral branches. Thus, as far as I can tell from the imperfect material now available, there seems to be a fundamental difference. I do not know which branching pattern is ancestral in the clade containing both *Excentradenia* and *Hiraea*.

Excentradenia is a genus of northern South America (Fig. 1). Three of the species (*E. adenophora*, *E. boliviana*, and *E. propinqua*) form a tight complex, and the fact that one of them is disjunct across the Amazon from the others is intriguing. The fourth species, *E. primaeva*, is both morphologically and geographically quite isolated.

Excentradenia is a nice example of how poorly lianas are known. For the four species I am recognizing here, we have a total of only 12 collections, an average of three per species. The only conclusion I can draw from such a number is that an incredible wealth of wonderful plants is still out there in tropical America waiting to be discovered—if those forests are spared for another generation or two.

FIG. 1. Distribution of *Excentradenia*.

KEY TO THE SPECIES OF EXCENTRADENIA

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| 1. Leaves abaxially persistently velutinous, the hairs erect and bifurcate. | <i>E. primaeva</i> . |
| 1. Leaves abaxially sericeous to glabrate, the hairs sessile and tightly appressed. | |
| 2. Leaves abaxially densely and persistently sericeous, even in age. | <i>E. propinqua</i> . |
| 2. Leaves glabrate at maturity, with the abaxial midrib and often the lateral veins \pm persistently sericeous and otherwise only sparse, scattered hairs persistent on the lamina. | |
| 3. Calyx bearing 8 glands on the 4 lateral sepals; small stipules present on base of petiole; lamina of larger leaves 8–15.5 cm long, the petiole 10–20 mm long; lateral wing(s) of samara with the sides not meeting at apex, leaving an evident gap. | <i>E. adenophora</i> . |
| 3. Calyx completely eglandular; stipules absent from vegetative leaves; lamina of larger leaves 14–19 cm long, the petiole 20–29 mm long; lateral wing of samara with the sides meeting or overlapping at apex, leaving little or no evident gap. | <i>E. boliviana</i> . |

Excentradenia adenophora (Sandwith) W. R. Anderson, comb. nov. *Hiraea adenophora* Sandwith, Kew Bull. 1951: 33. 1951.—TYPE: GUYANA. Dukalikuru Creek, Berbice River, 31 Mar 1938 fl, *Fanshawe in Forest Dept.* 2682 (holotype: K!, photos MICH, WRA negs. 81-5-17 [sheet I] & 18 [sheet II]). Fig. 2.

Stems densely and persistently sericeous. Leaves opposite, subopposite, or alternate; lamina of larger leaves 8–15.5 cm long, 4.5–10.3 cm wide, ovate or elliptical to orbicular, rounded or truncate at base, eglandular or bearing a few tiny buttonlike glands along margin, obtuse or rounded and abruptly short-acuminate at apex, adaxially glabrate at maturity with the midrib usually persistently sericeous, abaxially persistently sericeous on midrib and major lateral veins and otherwise nearly to quite glabrate, the lateral veins 7–10 pairs and connected by parallel cross-veins 3–6 mm apart, the veins and reticulum prominent below and

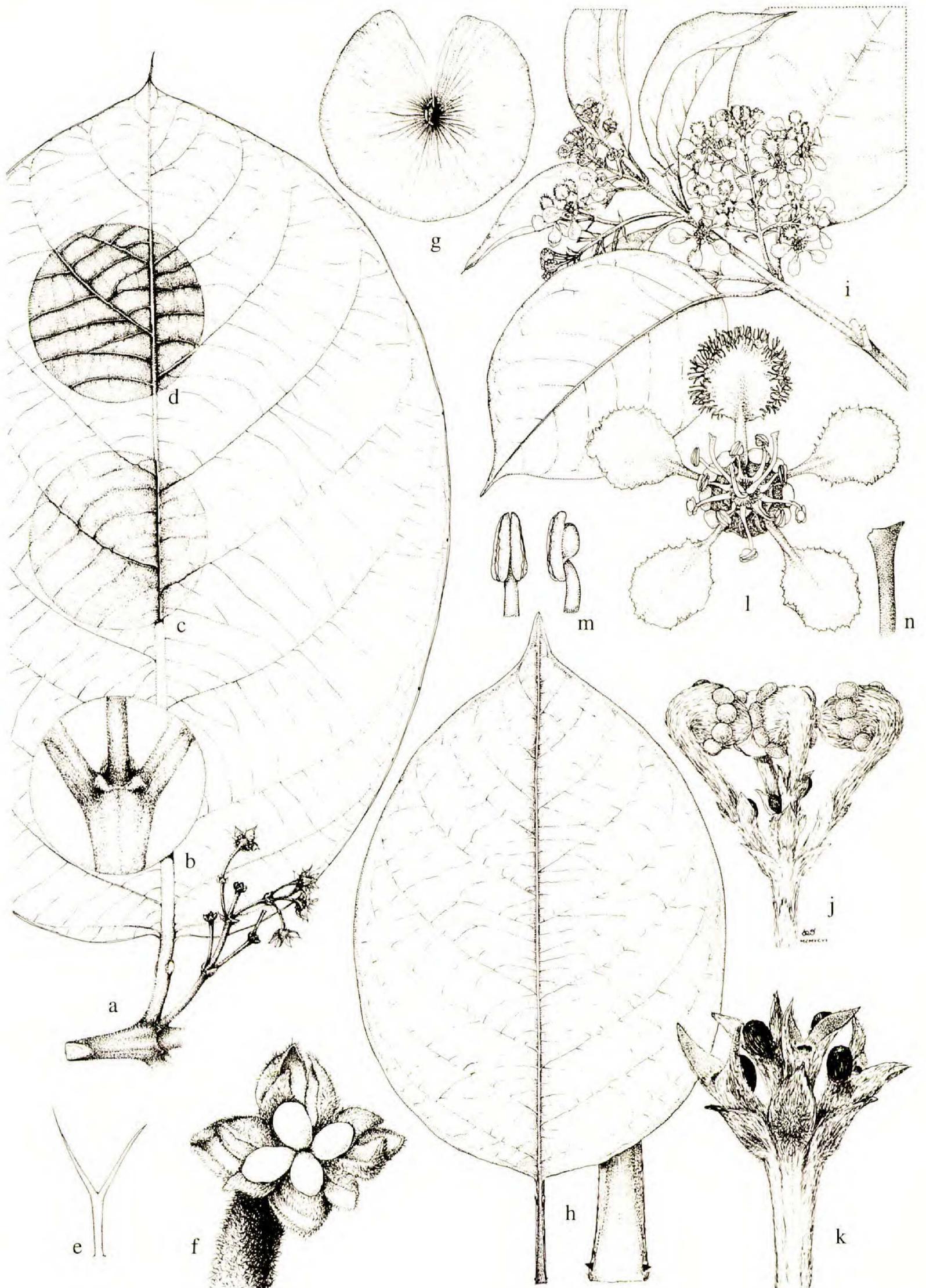


FIG. 2. *Excentradenia primaeva* and *E. adenophora*. a–g, *E. primaeva*: a) leaf and old infructescence, $\times 0.5$; b) stipules, $\times 1$; c) detail of adaxial surface of lamina, minus hairs, $\times 0.5$; d) detail of abaxial surface of lamina, minus hairs, $\times 0.5$; e) hair from abaxial surface of lamina, $\times 0.5$; f) bracts and bracteoles of umbel, with eccentric glands on 4 bracteoles, $\times 7.5$; g) samara, abaxial view, $\times 0.5$. h–n, *E. adenophora*: h) large leaf, adaxial view, $\times 0.5$, and base of petiole with stipules, $\times 2.5$; i) flowering branch, $\times 0.5$; j) umbel of 4 circinate buds, $\times 2.5$; k) base of umbel enlarged to show eccentric glands on 4 bracteoles, $\times 5$; l) flower from above, with posterior petal uppermost, $\times 2.5$ (in nature the stamens would be less spreading, probably nearly erect); m) anthers, adaxial view (left) and side view (right), $\times 10$; n) distal portion of style, side view, $\times 10$. Drawn by Karin Douthit, a–g from Nascimento *et al.* 135, h–n from Fanshawe in Forest Dept. 5604; the drawings of *E. primaeva* were originally published as part of Fig. 50, Mem. New York Bot. Gard. 32: 241. 1981, under the basionym, *Hiraea primaeva*.

visible above in dried leaves; petiole 10–20 mm long, 1.2–2 mm in diameter, densely and persistently sericeous, bearing between middle and apex a pair of glands 1.4–2 mm long; stipules 0.4–0.8 mm long, triangular, borne on petiole at very base. Inflorescence densely and persistently sericeous, 2–5 cm long, comprising (3–) 5–7 (–9) umbels, each borne on a stalk 5–10 mm long; floriferous bracts 2–2.5 mm long, triangular or ovate, abaxially sericeous, adaxially glabrous; floriferous peduncle 1–2.5 mm long; bracteoles 1–1.5 mm long, ovate or triangular, abaxially sericeous, adaxially glabrous, borne at apex of peduncle; pedicel 7–10 mm long, 0.5–1 mm in diameter, up to 2.5 mm in diameter at apex, sericeous. Sepals 3.5–4 mm long, 2–2.5 mm wide, abaxially sericeous, adaxially glabrous, the anterior eglandular, the lateral 4 biglandular with the glands 1.5–2.2 mm long. Lateral 4 petals with the claw 2.5–3 mm long, the limb 4–5 mm long and wide, dentate to lacinate, eglandular; posterior petal with the claw 4.5 mm long, the limb 4.5 mm long, 5 mm wide, fimbriate with the long slender divisions somewhat glandular-thickened at apex. Stamens with filaments opposite sepals 3–3.5 mm long, erect and straight or curved distally toward posterior petal, filaments opposite petals 2–2.5 mm long, erect, straight; anthers 0.7–0.9 mm long, the connective yellow. Ovary sericeous; styles bowed outward (i.e., curved outward from base and then back toward center of flower), sparsely sericeous in proximal half, dorsally apiculate at apex with the projection 0.1–0.2 mm long, the anterior style 3.4–3.7 mm long, the 2 posterior styles 4.5 mm long. Samara depressed-circular with the nut positioned below the center, 57–66 mm wide, ca 50 mm high, the lateral wing continuous at base and incised to nut at apex *or* butterfly-shaped with the lateral wings separate (incised to nut at both apex and base), each lateral wing 25 mm wide and 30 mm high; sides of lateral wing(s) not meeting at apex, leaving an evident gap, sinuous at margin, thinly sericeous with very fine white appressed hairs; dorsal wing 2–3 mm wide, 5–6 mm high, coarsely dentate; nut ca 4 mm in diameter, finely sericeous.

ADDITIONAL SPECIMENS EXAMINED: **Guyana.** Bartica–Potaro Road, 51st mile, wallaba bush on white sand, fl [without date], *Dawson in Forest Dept. 2010* (K); Groete Creek, Essequibo River, mixed “ropy” forest on lateritic soil, Mar fr, *Fanshawe in Forest Dept. 4485* (K); Barabara Creek, Mazaruni River, Mar fl, *Fanshawe in Forest Dept. 5604* (K, NY, US). **Venezuela.** BOLÍVAR: 20–35 km SW of El Manteco, road to San Pedro de las Dos Bocas, 7°10'N, 62°55'W, 200 m, disturbed primary forest, Aug fl buds, *Liesner & González 5954* (MO, VEN).—DELTA AMACURO: E side of Río Cuyubini, Cerro La Paloma, Sierra Imataca, vicinity of large granitic boulders, 100–200 m, Nov fr, *Steyermark 87644* (MICH, NY, VEN).

This was the first species of the genus to be described, and it is the best known, with a total of six collections from northern Guyana and adjacent Venezuela (Fig. 1). It is known from forests at low elevations (to 200 m), and has been collected with flowers and fruits in March, with flower buds in August, and with fruits in November.

I have seen only two collections with fruits. One of them, *Steyermark 87644*, has subcircular samaras with the lateral wing continuous at the base, like the other species of *Excentradenia*. In the other, *Fanshawe in Forest Dept. 4485*, the samaras, although not well preserved, seem to show clearly that there are two separate lateral wings, as in *Hiraea*. Only the accumulation of additional collections of *E. adenophora* in fruit will permit assessment of the variation in this important character in this species.

Excentradenia boliviana W. R. Anderson, sp. nov.—TYPE: BOLIVIA. Beni: Cachuela Esperanza, Río Beni, Yuta road, Jan 1924 fr, *Meyer 381* (holotype: MICH!; isotype: NY!).

Lamina foliorum majorum 14–19 cm longa, 7–10.4 cm lata, ovata ellipticave, margine glandulis parvis instructa, utrinque glabrata praeter costam et nervos laterales; petiolus 20–29 mm longus; stipulae non visae in foliis vegetativis. Sepala omnia eglandulosa. Samara 40–60 mm lata, 35–50 mm alta; ala lateralis basi continua, lobis supra plus minusve superpositus.

Stems densely and persistently sericeous. Leaves opposite or subopposite; lamina of larger leaves 14–19 cm long, 7–10.4 cm wide, ovate or elliptical, cuneate to rounded at base, bearing a series of tiny impressed buttonlike glands along margin, abruptly short-acuminate at apex, adaxially glabrate at maturity with the midrib sometimes persistently sericeous, abaxially persistently sericeous on midrib and sometimes on major lateral veins and otherwise nearly to quite glabrate, the lateral veins 9–11 pairs and connected by parallel cross-veins 3–7 mm apart, the veins prominent below and impressed above in dried leaves, the reticulum visible on both sides; petiole 20–29 mm long, 1.5–2.5 mm in diameter, densely and persistently sericeous, bearing between middle and apex a pair of glands 1.7–2.8 (–4) mm long; stipules not found on vegetative leaves, but present as tiny triangles on bracts of inflorescence axis. Inflorescence densely and persistently sericeous, 1.5–2.5 cm long, comprising 3–7 umbels, each borne on a stalk 1–7 mm long; floriferous bracts 1.5–2 mm long, triangular or ovate, abaxially sericeous, adaxially glabrous; floriferous peduncle 1–1.5 mm long; bracteoles 1–1.5 mm long, ovate or triangular, abaxially sericeous, adaxially glabrous, borne at apex of peduncle; pedicel 14–15 mm long in fruit, 0.5–0.8 mm in diameter, up to 2 mm in diameter at apex, sericeous. Flowers not seen. Sepals 4.5 mm long and 3 mm wide in fruit, abaxially sericeous, adaxially glabrous, all eglandular. Samara depressed-circular with the nut positioned below the center, 40–60 mm wide, 35–50 mm high; lateral wing continuous at base, incised to nut at apex with the two sides meeting or overlapping, leaving little or no evident gap, sinuous at margin, thinly sericeous with very fine white appressed hairs; dorsal wing 5–8 mm wide, 5–12 mm high, coarsely dentate; nut 5 mm in diameter, finely sericeous.

ADDITIONAL SPECIMEN EXAMINED: **Bolivia**. BENI: Cachuela Esperanza, Río Beni, Nov 1923 fr. *Meyer 378* (NY).

This species is known only from the fruiting specimens cited, which were collected by G. Meyer two months apart at the same location in Bolivia (Fig. 1); the species is to be expected in adjacent Brazil. The epithet refers, of course, to the country of origin, which is of interest because this is the only species of *Excentradenia* known from southern Amazonia. *Excentradenia boliviana* is very similar to *E. adenophora* in the characters for which I have information now, but it has estipulate leaves with longer petioles and longer laminas, its sepals are all eglandular, and the lobes of the lateral wing of the samara meet and overlap above the nut, as in *E. propinqua* but not *E. adenophora*. When *E. boliviana* is collected with flowers, those may strengthen the morphological separation of these transamazonian sisters.

Excentradenia primaeva (W. R. Anderson) W. R. Anderson, comb. nov. *Hiraea primaeva* W. R. Anderson, Mem. New York Bot. Gard. 32: 240. 1981.—

TYPE: BRAZIL. Amazonas: S. Gabriel, Q. NA-19-ZC, 12 Apr 1975 fr, *Nascimento, Pires & Coradin 135* (holotype: IAN!; isotype: MICH!). Fig. 2.

Stems velutinous with the hairs up to 0.6 mm long, erect, fusiform, generally short-bifurcate. Leaves opposite; lamina (except apex) 23–32 cm long, 16–25 cm wide, broadly elliptical, rounded or subcordate at base, revolute and bearing many small glands at margin, rounded and very abruptly caudate at apex with the tip 8 mm long, persistently velutinous on both sides with the hairs erect, stalked, and bifurcate, the lateral veins 9–11 pairs, the parallel tertiary veins mostly 5–7 mm apart, the veins impressed above and prominent below; petiole 21–30 mm long, 4–5 mm in diameter, velutinous, bearing near middle a pair of glands 2–3.5 mm in diameter; stipules 1–1.5 mm long, triangular, borne on petiole at very base (?) or interpetiolar. Inflorescence velutinous, up to 8 cm long, comprising 3–7 umbels, each borne on a stalk 9–13 mm long; floriferous bracts 1.5–2 mm long, triangular, abaxially subvelutinous, adaxially glabrous; peduncle absent; bracteoles 1–1.5 mm long, ovate, abaxially subvelutinous, adaxially glabrous; pedicel 11–15 mm long in fruit, 0.8–1.5 mm in diameter, up to 2.5 mm in diameter at apex, subvelutinous. Sepals 2.5–3 mm long beyond glands, 2.5–3 mm wide, up to 3.5 × 4 mm in fruit, abaxially velutinous, adaxially glabrous, the anterior eglandular, the lateral 4 biglandular with the glands 2–2.5 mm in diameter. Lateral petals with the limb denticulate and eglandular, the posterior with the limb long-glandular-fimbriate. Stamens with filaments 3–5 mm long, straight; anthers 1–1.5 mm long. Ovary velutinous; styles (in fruit) 4.5–5.5 mm long, straight, sericeous at base, with a dorsal hook ca 0.3 mm long at apex. Samara subcircular or transversely broadly elliptical with the nut positioned near center, 50–65 mm wide, 40–50 mm high; lateral wing continuous at base, incised to nut at apex with the sides not overlapping and leaving an evident gap, entire and sinuate at margin, puberulous; dorsal wing 5–6 mm wide, 5–8 mm high, dentate; nut 5 mm in diameter, shortly velutinous.

The above description is translated and modified from the original. In the protologue I described the inflorescence as a cyme, but the type shows it to have the kind of raceme of umbels described above in the discussion of the genus. The species is still known only from the type collection, so my information about its flowers is very incomplete. With its huge velutinous leaves, *Excentradenia primaeva* is quite unlike the other three species of the genus, and it is far-disjunct from them, too (Fig. 1).

Excentradenia propinqua (W. R. Anderson) W. R. Anderson, comb. nov. *Hiraea propinqua* W. R. Anderson, *Brittonia* 46: 131. 1994.—TYPE: FRENCH GUIANA. Rivière Tampoc ["Tampok"], dans une île, 6 Apr 1977 fr, *Moretti 696* (holotype: MICH!; isotype: CAY, not seen).

Stems densely and persistently sericeous. Leaves opposite or subopposite; lamina of larger leaves 10–14.3 cm long, 6–9.7 cm wide, ovate, rounded or truncate at base, usually bearing a series of tiny buttonlike glands on distal half of margin and occasionally 1–2 somewhat larger glands on margin near base, obtuse or abruptly short-acuminate at apex, adaxially sparsely sericeous to glabrate at maturity with the midrib usually persistently sericeous, abaxially densely and persistently sericeous, the lateral veins 7–9 pairs and connected by parallel cross-veins 3–6 mm apart, the veins and reticulum prominent below and visible above in dried leaves; petiole 12–20 mm long, 1.5–2 mm in diameter, densely and persistently

sericeous, bearing at or slightly below apex a pair of glands 1.1–1.8 mm long; stipules 0.4–0.6 mm long, triangular, borne on petiole at very base or on stem beside petiole. Inflorescence densely and persistently sericeous, 2–5 cm long, usually comprising 7 umbels, each borne on a stalk 5–10 mm long; floriferous bracts 2–2.5 mm long, triangular or ovate, abaxially sericeous, adaxially glabrous; floriferous peduncle 0.5–2.5 mm long; bracteoles 1–1.5 mm long, ovate, abaxially sericeous, adaxially glabrous, borne at apex of peduncle; pedicel 7–10 mm long in flower, 12–14 mm long in fruit, 0.5–1 mm in diameter, up to 2.5 mm in diameter at apex, sericeous. Sepals 3.5–4.5 mm long, 2.5–3 mm wide, abaxially sericeous, adaxially glabrous, all eglandular or the anterior eglandular and the lateral 4 biglandular with the glands 1.5–2.3 mm long. Lateral 4 petals with the claw 3–3.5 mm long, the limb 4.5–5 mm long and wide, lacinate, eglandular; posterior petal with the claw 5 mm long, the limb ca 6 mm long, 7 mm wide, fimbriate with the long slender divisions somewhat glandular-thickened at apex. Stamens with filaments opposite sepals ca 4 mm long, erect but curved distally toward posterior petal, filaments opposite petals 2.5–3 mm long, erect, straight; anthers 1–1.3 mm long, the connective yellow. Ovary sericeous; styles bowed outward (i.e., curved outward from base and then back toward center of flower), sparsely sericeous in proximal half, dorsally acute or apiculate at apex with the projection up to 0.1 mm long, the anterior style 4 mm long, the 2 posterior styles 4.7 mm long. Samara depressed-circular with the nut positioned below the center, 48–56 mm wide, 42–50 mm high; lateral wing continuous at base, incised to nut at apex with the two sides overlapping, leaving little or no evident gap, sinuous at margin, thinly sericeous with very fine white appressed hairs; dorsal wing 3–5 mm wide, 5–7 mm high, entire or coarsely dentate; nut ca 3 mm in diameter, finely sericeous.

ADDITIONAL SPECIMENS EXAMINED: **Guyana.** Rupununi Distr., Kumukowau River, Camp 3, 2°56'N, 59°02'W, 160 m, forest along river, Feb fl, *Jansen-Jacobs et al.* 3774 (MICH). **Suriname.** Forest near Brownsveg, Distr. Brokopondo, Feb fl, *Lindeman, Mennega, et al.* 51 (MICH, NY).

As I noted in the protologue, this species is very similar to *E. adenophora*, but its densely and persistently sericeous leaves distinguish it immediately. The two species are also geographically disjunct (Fig. 1). *Excentradenia propinqua* has been collected in flower in February, and in fruit in April.

ACKNOWLEDGMENTS

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LITERATURE CITED

- Anderson, W. R. 1994. New species of *Hiraea* (Malpighiaceae) from the Guianas and adjacent Brazil. *Brittonia* 46: 126–133.